

## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
9 June 2005 (09.06.2005)

PCT

(10) International Publication Number  
**WO 2005/051812 A1**

- (51) International Patent Classification<sup>7</sup>: **B65G 47/90**
- (21) International Application Number: PCT/GB2004/004517
- (22) International Filing Date: 27 October 2004 (27.10.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
- |           |                              |    |
|-----------|------------------------------|----|
| 0325068.5 | 28 October 2003 (28.10.2003) | GB |
| 0415202.1 | 7 July 2004 (07.07.2004)     | GB |
| 0417665.7 | 9 August 2004 (09.08.2004)   | GB |
- (71) Applicant (for all designated States except US): **AEW DELFORD GROUP LTD [GB/GB]**; Main Road, Harwich CO12 4LP (GB).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **HAWES, Richard, John [GB/GB]**; 42 Ketts Oak, Heathersett, Norwich NR9 3DJ (GB).
- (74) Agent: **KEITH W NASH & CO**; 90-92 Regent Street, Cambridge CB2 1DP (GB).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

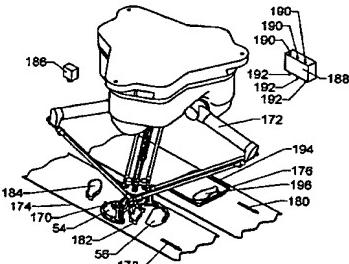
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

## Published:

- with international search report
- with amended claims and statement

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: IMPROVED PICK AND PLACE GRIPPER



(57) Abstract: Tooling is described for securing to the movable end of a computer-controlled robotic arm, by which articles can be picked up, optionally rotated and lowered into a new position. The tooling comprises two blades each having a leading edge and trailing edge, movable between a first position in which their leading edges are separated by a large gap and a second position in which the leading edges overlap, or are in contact or are separated by a smaller gap. Drive means effects the relative movement between the two blades whereby in use the tooling can be lowered with the blades separated and on opposite sides of an article until the blades just make contact with a surface on which the article is resting, and the drive means is operated so as to move the blades inwardly below the article, so that when subsequently the tooling is raised the article is lifted therewith. The tooling may include a vacuum chuck or two or more spikes each of which positively engages in the article, and rotation of the article is achieved by rotating the vacuum chuck or a member from which the spikes depend, in a plane which is generally parallel to the plane containing the two blades. A support member may be positioned above each of the blades, and the drive means moves both the support members and the blades until an article is gripped between the support members, and thereafter only the blades continue to move below the article. The drive means maintains the support members in the article gripping position as the blades are subsequently withdrawn from below the article, to prevent frictional drag on the underside of the latter from separating or moving the article. Typically the drive means only disengages the support members from the article after the blades have moved from therebelow. A viewing system provides image signals to a robotic-arm-controlling computer, to determine the orientation of each article to be picked up, and to generate control signals for rotating the tooling accordingly.